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The Flora of Baca County, Colorado

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A FLORA OF BACA COUNTY, COLORADO

by

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Joe McCall Anderson, Jr.

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The Flora of Baca County, Colorado

Thesis directed by Professor W. A. Weber

Baca County, the southeasternmost county of Colorado, ranges from 3500 feet to 5100 feet above sea level in the Arkansas and Cimarron drainage systems. It is a relatively smooth plain except for the mesa and canyon region of its southern and western parts.

Annual precipitation averages 13.62 inches to 15.76 inches. Dry-land farming and grazing are practiced except when the region is converted into dune areas in dry years. A natural plains grassland vegetation, remaining in the sand arroyos, has been replaced on most of the cultivated northern part of the county by coarse, weedy species. The relatively undisturbed canyon region supports an apparently relict Rocky Mountain element typified by ponderosa pine. Sand dunes and hills along the Cimarron support a rich vegetation, many species of which were not previously known to exist in Colorado. The flora has affinities to the Llano Estacado of Texas and to the flora of the southwestern United States.

An annotated check list of species is included in the paper. This report is a part of a comprehensive floristic survey of Colorado by counties.

This abstract of about 179 words is approved as to form and content. I recommend its publication.

Signed Wm A. Weber
Instructor in charge of thesis

Acknowledgments

The writer wishes to gratefully acknowledge the advice and assistance of the following authorities and curators of herbaria, who, through their kindness and generosity, contributed in various ways to the completion of this work: Dr. William A. Weber, who directed the study; Dr. H. D. Harrington, Curator of the Herbarium, Colorado A. & M. College, for the use of his unpublished distribution maps; Dr. C. L. Porter, Curator of the Rocky Mountain Herbarium; Dr. E. C. Smith, Colorado A. & M. College, for identification of willows; and Dr. C. W. T. Penland, Colorado College, for identification of species of Penstemon. To all of these persons, he wishes to express his appreciation for their generosity in making their herbaria available for examination at various times.

TABLE OF CONTENTS

THE FLORA OF BACA COUNTY, COLORADO

This report is an attempt to bring together from scattered sources the record of botanical explorations in Baca County, Colorado. The survey of the Baca County flora is a part of a comprehensive program of floristic surveys, county by county, of the State of Colorado, which is being undertaken by the Department of Biology and the Museum of the University of Colorado. Other county surveys completed or in progress are those of Boulder County (Weber, 1949), Moffat County (Bradley, in progress), and Montezuma County (Weber, in progress).

Baca County is the southeasternmost county of Colorado. It is bounded by the State of Kansas on the east, by the Oklahoma Panhandle on the south, by Prowers and Bent counties in Colorado on the north, and by Las Animas County on the west. It is the tenth largest county of the state, having an area of 1,641,600 acres. It is situated within the drainage systems of the Arkansas and Cimarron rivers. Elevations range from 3500 feet above sea level on the Cimarron River to 5100 feet on Carrizo Mountain.

The average annual precipitation for Baca County ranges from 15.76 inches (Springfield) to 13.62 inches (Two Buttes). Most of this falls during May, June, and July. Rainfall is often sudden and torrential and accompanied by high winds. Dust storms of great proportions may precede

the rains. Temperatures fluctuate from a maximum recorded at Two Buttes Station of 111 degrees F. to a minimum of minus 41 degrees F. The average temperature for January is 31.1 degrees F., for July 76.6 degrees F. The average length of the frost-free period is 169 days.

Baca County is principally a farming area, in which broom corn and wheat are the major crops. Most of the county is a level plain, with the exception of the extreme southern and western portions which are characterized by rimrock and canyons. This latter area is the easternmost extension of the Mesa de Maya. Dry farming utilizes 665,567 acres of the flat plains of the north, central, and eastern parts of the county. In the southern and western portions, where the topography is too rugged to permit cultivation, 700,537 acres are grazing lands.

Baca County is part of the region recognized as the "Dust Bowl" during the drought of the 1930's. The creeks and rivers are dry during part of the year and have wide, shallow channels with sand bars and dunes along the banks. The soil of the northern section is sandy, and in dry years farms are converted by winds into dune areas upon which it is impossible to raise a crop. In wet years such dunes are stabilized to some extent by the growth of grasses and coarse weeds. Natural vegetation is largely lacking from the northern two-thirds of the county because of the extensive cultivation of the area. Islands of native plant communities remain in the uncultivated sand

arroyos. (See map, Geologic Formations.)

Because the canyon country to the south and west is unsuitable for farming, the native vegetation is relatively undisturbed. The rimrock is covered with sparse growths of low shrubs such as Dalea formosa, Mimosa borealis, and Cercocarpus montanus. The crevices of the cliffs support a varied group of species, the most interesting of which are certain rare species of ferns, for example, Cheilanthes eatoni, Notholaena standleyi, and Asplenium platyneuron. Talus slopes below the rimrock support dense stands of two species of oak, Quercus gambelii and Q. undulata, hackberry (Celtis occidentalis), wax currant (Ribes cereum) and skunkbrush (Rhus trilobata). Small groves of the chinaberry (Sapindus saponaria) are occasionally found.

On the slopes of the larger canyons of the Carrizo Creek region, Pinus edulis, Juniperus monosperma, and Juniperus virginiana var. scopulorum comprise the characteristic community. In the upper portions of these canyons some of the largest oak trees to be seen in Colorado are found. Many individuals are as much as thirty feet in height.

Along the streambanks, the common trees are Populus wislizeni and Salix amygdaloides. The cardinal flower, Lobelia cardinalis, is a characteristic summer flower here, although it is very rare elsewhere in Colorado. Wherever pools of water stand in the

intermittent streams, species of Carex and Juncus grow along the shores. Isolated stands of Andropogon saccharoides occur on the open canyon bottoms.

The flora of the sand dunes and hills along the Cimarron River is unusually rich and varied, and supports many species which were previously not known to occur in Colorado. Calamovilfa gigantea is a pioneer on the shifting sands, and Artemisia filifolia, Stillingia salicifolia, and Chrysothamnus pulchellus are conspicuous shrubby vegetation on the better stabilized areas. Andropogon hallii is abundant on the sandy blowouts, and on the sand flats, Redfieldia flexuosa, Sporobolus cryptandrus and S. giganteus, Desmanthus illinoensis, and other characteristic plants of sandy areas abound. The sand bars of the river are overgrown by thickets of Tamarix gallica and Salix interior.

The cultivated and the abandoned farmlands of the northern part of the county support a rich assortment of coarse weedy species, the most prominent of which are Helianthus annuus, Amaranthus torreyi, Panicum capillare, Polygonum pennsylvanicum, and Franseria tomentosa. Small groves of honey locust and russian olive are often the only evidence remaining of a former homestead. Remnants of the plains grassland and associated species, such as Yucca glauca, persist where farming has not been practised.

Baca County is a difficult area for plant collecting. Transportation is poor over unimproved roads

and trails. Torrential rainfall during the collecting season swells the temporary streams and dry arroyos making most roads muddy and impassable and washing sand across the frequent fords. There is little drinking water to be had and good campsites are scarce. Only one major paved highway crosses the county, good-sized towns are few and far between, and a collector finds it necessary to carry all water and supplies, including supplementary gasoline, into the field.

Except for collections of plants made within the past twenty years, the flora of Baca County has been very inadequately sampled. The important exploring expeditions of the 19th century travelled along routes which by-passed the region, although it is possible that the party of Dr. Edwin James may have crossed the area. In the 1930's, J. H. Christ, Christ and Austin, and Scharff, collected in Baca County for the United States Department of Agriculture. A set of these specimens is at the Herbarium of Colorado A. & M. College. Dr. H. D. Harrington and Dr. E. C. Smith, of Colorado A. & M. College, made collections in 1947 and 1948. Dr. C. L. Porter collected in the area in May, 1947. His specimens are to be found at the Rocky Mountain Herbarium of the University of Wyoming. Dr. C. W. T. Penland made collections in 1946. His plants are in the Colorado College herbarium. Dr. C. M. Rogers, of Wayne University, Detroit, Michigan, collected plants in the county in connection with a vegetational survey of the

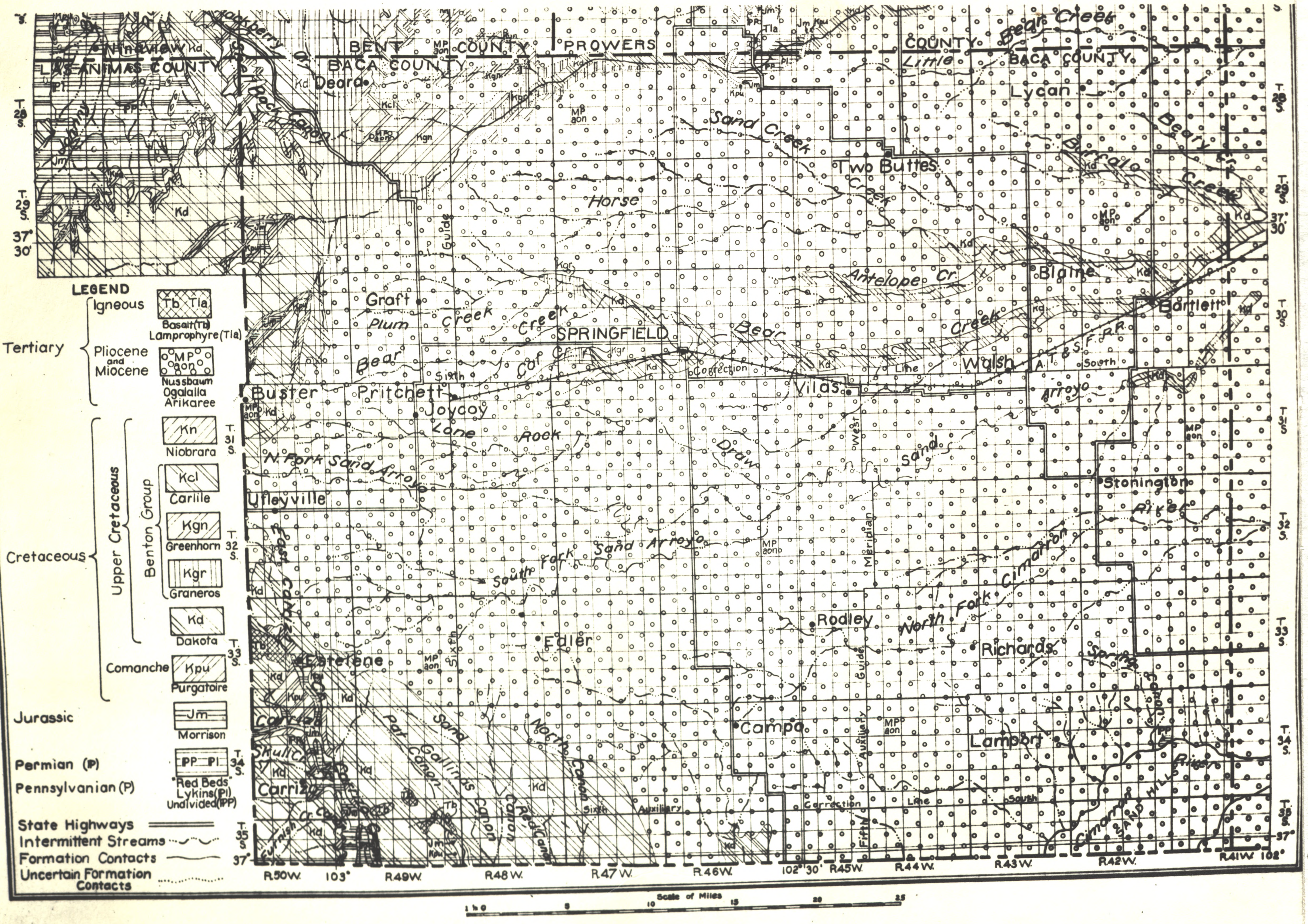
Mesa de Maya region of Las Animas and Baca counties in Colorado and Cimarron County, Oklahoma. Rogers' first set is at the University of Michigan, and his second set is in the University of Colorado herbarium. Dr. W. A. Weber, of the University of Colorado, and the present writer collected several hundred species in Baca County during 1948 and 1949. This collection forms the chief basis of this report and is filed in the University of Colorado herbarium. Duplicate sets of this collection have been sent to many of the leading herbaria of the United States.

The study of the Baca County flora began with an examination of distribution maps of the plants of Colorado which were prepared by Dr. H. D. Harrington in the course of his revision of a Manual of the Flora of Colorado. From these maps, a tentative list was prepared to include all species which had been reported from or which might reasonably be expected to occur in Baca County. This list was used as the basis of a thorough search, through the herbaria of the region, for Baca County collections of these species. Several visits were made to the following herbaria for purposes of checking identifications of Baca County material: Colorado A. & M. College; Rocky Mountain Herbarium of the University of Wyoming; and Colorado College.

During the preparation of the check-list, field trips were conducted to the area, and a final field trip was made in August, 1949, in order to collect certain species

which had been overlooked previously. Specimens collected by Dr. Weber on trips financed by the University of Colorado Council on Research and Creative Work were of great value to this study. Dr. C. M. Rogers' collection of Mesa de Maya plants, which he kindly presented to the University of Colorado herbarium, were also of great utility.

The study of the Baca County flora has demonstrated that this area is a very critical one for several reasons: 1) a large number of species enter Colorado only in this area, and many of these were not known to occur in Colorado before this study was undertaken; 2) these species show affinities with the flora of the southern Great Plains, particularly the Llano Estacado of Texas, and with the flora of southwestern United States; 3) the Rocky Mountain element, typified in this area by the ponderosa pine forest community, appears to be relict. However, because the distribution patterns of many of the species concerned are not yet well known, further studies are awaited before evaluation of these patterns can be attempted.


LEGEND
Tertiary
Igneous
Tb Tla
Basalt (Tb)
Lamprophyre (Tla)
Pliocene and Miocene
MP aon
Nussbaum
Ogalalla
Arikaree
Cretaceous
Upper Cretaceous
Benton Group
Kn
Niobrara
Kcl
Carlile
Kgn
Greenhorn
Kgr
Graneros
Kd
Dakota
Comanche
Kpu
Purgatoire
Jurassic
Jm
Morrison
Permian (P)
Pennsylvanian (P)
PP Pl
Red Beds
Lykins (Pl)
Undivided (PP)
State Highways
Intermittent Streams
Formation Contacts
Uncertain Formation Contacts
BENT COUNTY
PROWERS COUNTY
BACA COUNTY
LAS ANIMAS COUNTY
SPRINGFIELD
Two Buttes
Lycan
Deora
Graft
Plum Creek
Bear Creek
Sand Creek
Horse Creek
Antelope Cr.
Buffalo Creek
Bear Creek
Little Bear Creek
Blaine
Bartlett
Walsh
A.T. & S.F. R.R.
Vilas
Buster
Pritchett
Joycoy
Lone Rock
N. Fork Sand Arroyo
Draw
Sand Arroyo
Ufleyville
South Fork Sand Arroyo
Stonington
Cimarron
North Fork
Rodley
Richards
Edler
Estelene
Campo
Lampert
Carrizo
Pat Canon
Gallinas Canon
North Canon
Red Canon
Sand Canon
Sand Hills
Cimarron River
Kd
MP aon
Guide
Sixth
Correction
Line
South
West
Meridian
Fifth
Auxiliary
T. 28 S.
T. 29 S.
T. 30 S.
T. 31 S.
T. 32 S.
T. 33 S.
T. 34 S.
T. 35 S.
37° 30'
37°
R.50W.
103°
R.49W.
R.48W.
R.47W.
R.46W.
102° 30'
R.45W.
R.44W.
R.43W.
R.42W.
R.41W.
102°
Scale of Miles
0 5 10 15 20 25

ANNOTATED CHECK LIST OF VASCULAR PLANTS OF BACA COUNTY, COLORADO

PTERIDOPHYTA

EQUISETACEAE

Equisetum kansanum Schaffner.

Sand and Gallinas Canyons, Weber 4620.

POLYPODIACEAE

Asplenium platyneuron (L.) Oakes.

Sand and Gallinas Canyons, Weber 4351.

Cheilanthes eatoni Baker.

Mouth of Sand Creek Canyon, Weber 3290.

Cheilanthes feei Moore.

Sand and Gallinas Canyons, Weber 4628.

Dryopteris filix-mas (L.) Sw.

Sand and Gallinas Canyons, Weber 4625.

Notholaena standleyi Maxon.

Sand and Gallinas Canyons, Weber 4334.

Pellaea atropurpurea (L.) Link.

Mouth of Sand Creek Canyon, Weber 3289.

Pellaea wrightiana Hook.

Mouth of Sand Creek Canyon, Weber 3289.

Woodsia mexicana Fee.

Sand and Gallinas Canyons, Weber 4353.

Woodsia oregana D. C. Eaton

Mouth of Sand Creek Canyon, Weber 3288.

SELAGINELLACEAE

Selaginella mutica D. C. Eaton.

Mouth of Sand Creek Canyon, Weber 3287.

Selaginella underwoodii Hieron.

Mouth of Sand Creek Canyon, Weber 3287.

SPERMATOPHYTA

GYMNOSPERMAE

PINACEAE

Juniperus monosperma (Engelm.) Sarg.

No collections. Observed in canyons.

Juniperus virginiana L. var. scopulorum (Sarg.) Bens.

Breaks of East Carrizo Creek, Weber 5196.

Pinus edulis Engelm.

Breaks of Carrizo Creek, Weber 3298.

Pinus ponderosa Lawson var. scopulorum Engelm.

No collections. Observed on mesa slopes.

ANGIOSPERMAE

ANACARDIACEAE

Rhus trilobata Nutt. ex T. & G.

No collections. Observed on mesa slopes.

AMARANTHACEAE

Amaranthus torreyi (Gray.) Benth.

Grassland of mesa top, Pritchett, Weber 5179.

Froelichia floridana var. campestris (Small) Fernald.

Carrizo Canyon, Harrington 3385.

Tidestromia lanuginosa (Nutt.) Standl.

Sand hills of Cimarron River, Weber 5199.

APOCYNACEAE

Apocynum sibiricum Jacq. var. salignum (Greene) Fernald.

South of Springfield, Harrington & Smith 342.

Apocynum suksdorfii Greene.

South of Springfield, Harrington & Smith 343.

ASCLEPIADACEAE

Asclepias arenaria Torr.

South of Springfield, Harrington & Smith 355.

Asclepias capricornu Woods.

Sand and Gallinas Canyons, Weber 4626.

Asclepias engelmanniana Woods.

Sand Creek Canyon, Harrington 3302.

Asclepias latifolia (Torr.) Raf.

Sand Creek Canyon, Weber 4333.

* Asclepias macrotis Torr.

Sand Creek Canyon, Weber 4318.

Asclepias pumila (Gray) Vail.

Carrizo Canyon region, Porter 4294.

Asclepias uncialis Greene.

Mouth of Sand Creek Canyon, Weber 3294.

Asclepias viridiflora Raf.

Carrizo Canyon region, Porter 4289.

Sarcostemma crispum Benth.

Sand Creek Canyon, Harrington 3353.

Sarcostemma lobata Waterfall.

No collection. Collected by Waterfall just north of Black Mesa, in Cimarron County, Oklahoma.

BORAGINACEAE

Cryptantha crassisepala (T. & G.) Greene.

10 mi. north Kenton, Oklahoma, Rogers 5688.

Cryptantha minima Rydb.

Sand and Gallinas Canyons, Weber 4606.

Cryptantha thyrsiflora (Greene) Pays.

Sand Creek Canyon, Harrington 3297.

Cryptantha virgata (Porter) Pays.

15 miles west of Springfield, Harrington & Smith 294.

Heliotropium convolvulaceum (Nutt.) Gray.

Sands of Cimarron River, Weber 5170.

Lappula redowskii (Hornem.) Greene.

Sand Creek Canyon, Harrington 3357.

Lithospermum incisum Lehm.

Sand and Gallinas Canyons, Weber 4551.

CACTACEAE

Coryphantha vivipara (Nutt.) Britton and Rose.

Along Clay Creek, Weber 4552.

Echinocereus viridiflorus Engelm.

Sand Creek Canyon, Weber 4630.

Opuntia arborescens Engelm.

Prairies east of Carrizo Creek, Weber 3297.

Opuntia fragilis (Nutt.) Haw.

East of Sand Creek Canyon, Weber 4621.

CAMPANULACEAE

* Lobelia cardinalis L.

Sand and Gallinas Canyons, Weber 4408.

CAPPARIDACEAE

Cleome serrulata Pursh.

Sand hills of Cimarron River, Weber 5148.

Polanisia trachysperma T. & G.

South of Springfield, Harrington & Smith 326.

CARYOPHYLLACEAE

Arenaria hookeri Nutt.

Springfield, Christ 362.

Paronychia jamesii T. & G.

Sand and Gallinas Canyons, Weber 4343.

CELASTRACEAE

** Forsellesia planitierum Ensign. (endemic)

Type near Kenton, Cimarron County, Oklahoma.

CHENOPODIACEAE

Atriplex canescens (Pursh) Nutt.

Carrizo Canyon, Harrington 3379. (carpellate) and Harrington 3378. (staminate).

Atriplex rosea L.

Las Animas Co.: near Troy, Rogers 5387.

Chenopodium album L.

West of Springfield, Harrington & Smith 293.

Chenopodium cycloides A. Nels.

Las Animas Co.: south of Kim, Rogers 5039.

Chenopodium fremontii Wats.

Las Animas Co.: Tecolote Mesa, Rogers 5335.

Chenopodium hybridum L.

Las Animas County, just west of Baca County line, Weber 4407.

Chenopodium incanum (Wats.) Heller.

West of Springfield, Harrington & Smith 285.

Chenopodium leptophyllum Nutt.

Las Animas Co.: Tecolote Mesa, Rogers 4528.

Cycloloma atriplicifolium (Spreng.) Coult.

Between Kirkwell and Campo, Weber 5197.

Eurotia lanata (Pursh) Moq.

Sand Creek Canyon, Harrington 3355.

Kochia scoparia (L.) Schrad.

Between Kirkwell and Campo, Weber 5203.

Salsola kali L. var. tenuifolia Tausch.

Carrizo Creek, Weber 5109.

COMMELINACEAE

Commelina crispa Woot.

East Carrizo Creek, Weber 5094.

Tradescantia occidentalis (Britt.) Smyth.

Sand and Gallinas Canyons, Weber 4611.

COMPOSITAE

Ambrosia coronopifolia T. & G.

Breaks of East Carrizo Creek, Weber 5103.

Ambrosia trifida L.

Breaks of East Carrizo Creek, Weber 5128.

Artemisia campestris L.

Sand and Gallinas Canyons, Weber 4610.

Artemisia dracunculus Nutt.

Breaks of East Carrizo Creek, Weber 5114.

Artemisia filifolia Torr.

Sand and Gallinas Canyons, Weber 4571.

Artemisia ludoviciana Nutt.

East of Sand Creek Canyon, Weber 4614.

Aster tanacetifolius HBK.

Sagebrush flats along Cimarron River, Weber 4582.

Berlandiera lyrata Benth.

Breaks of Cimarron River, Weber 4591.

Bidens frondosa L.

Breaks of East Carrizo Creek, Weber 5127.

Echinacea angustifolia DC.

Carrizo Mountain, Rogers 4658.

Brickellia californica (T. & G.) Gray.

Breaks of East Carrizo Creek, Weber 5099.

Chrysopsis hispida (Hook.) DC.

20 miles south of Pritchett, Harrington 3327.

Chrysopsis villosa (Pursh.) Hook.

Breaks of East Carrizo Creek, Weber 5096.

Chrysopsis viscida (Gray) Greene.

Sandy flats of Cimarron River, Weber 5165.

Chrysothamnus pulchellus (Gray) Greene ssp. baileyi (Wooton & Standl.) Hall.

Sand hills of Cimarron River, Weber 5155.

Cirsium megacephalum (Gray) Ckll.

10 miles west of Springfield, Harrington & Smith 299.

Cirsium undulatum (Nutt.) Spreng.

Breaks of East Carrizo Creek, Weber 5101.

Conyza canadensis (L.) Cronquist.

Between Kirkwell and Campo, Weber 5186.

Dyssodia papposa (Vent.) Hitchc.

Breaks of East Carrizo Creek, Weber 5115.

Erigeron bellidiastrum Nutt.

Sandy flats of Cimarron River, Weber 5175.

Erigeron flagellaris Gray.

Sand Creek Canyon, Weber 4603.

Evax prolifera Nutt.

Carrizo Canyon, Harrington 3388.

Franseria acanthocarpa (Hook.) Coville.

Sandy flats of Cimarron River, Weber 5172.

Franseria tomentosa Gray.

Between Kirkwell and Campo, Weber 5205.

Gaillardia pulchella Foug.

25 miles south of Springfield, Harrington 3424.

Gnaphalium wrightii Gray.

Breaks of East Carrizo Creek, Weber 5090.

Grindelia squarrosa (Pursh) Dunal. var. inornata (Greene) Steyermark.

Mesa top above East Carrizo Creek, Weber 5150.

Grindelia squarrosa (Pursh) Dunal var. nuda (Wood) Gray.

Las Animas Co.: Mesa de Maya, Rogers 5012.

Gutierrezia sarothrae (Pursh) Britt. and Rusby.

Sand hills of Cimarron River, Weber 5185.

Haplopappus ciliatus (Nutt.) DC.

Sandy flats of Cimarron River, Weber 5152.

Haplopappus engelmannii (Gray) Hall.

Pritchett, Christ and Austin 3434.

Haplopappus spinulosus (Pursh) DC. ssp. typicus Hall.

Mesa top above East Carrizo Creek, Weber 5183.

Haplopappus spinulosus (Pursh) DC. ssp. australis (Greene) Hall.

Sand Arroyo south of Walsh, Weber 4563.

Haplopappus spinulosus (Pursh) DC. ssp. glaberrimus (Rydb.) Hall.

Mesa top above East Carrizo Creek, Weber 5182.

Hymenopappus tenuifolius Pursh.

Sand Creek Canyon, Weber 4601.

Hymenoxys scaposa (DC.) Parker var. linearis (Nutt.) Parker.

Sand Creek Canyon, Weber 3285.

Iva xanthifolia Nutt.

Breaks of East Carrizo Creek, Weber 5106.

Kuhnia chlorolepis Woot. and Standl.

Sand hills of Cimarron River, Weber 5201.

Kuhnia eupatorioides L. var. corymbulosa T. & G.

13 miles south of Pritchett, Rogers 6437.

Lactuca serriola L.

Between Kirkwell and Campo, Weber 5202.

Leucelene ericoides (Torr.) Greene.

Sand Arroyo south of Walsh, Weber 4565.

Liatris punctata Hook.

Breaks of East Carrizo Creek, Weber 5136.

Lygodesmia juncea (Pursh) D. Don.

Breaks of East Carrizo Creek, Weber 5116.

Melampodium cinereum DC.

Sand and Gallinas Canyons, Weber 4319.

Palafoxia hookeriana T. & G.

Breaks of East Carrizo Creek, Weber 5093.

Palafoxia macrolepis (Rydb.) Cory.

Sandy flats of Cimarron River, Weber 5166.

Pectis angustifolia Torr.

Breaks of East Carrizo Creek, Weber 5137.

Pericome glandulosa Goodman.

Breaks of East Carrizo Creek, Weber 5095.

Ratibida columnifera Woot. and Standl.

15 miles west of Springfield, Harrington & Smith 296.

Ratibida tagetes Barnh.

Between Kirkwell and Campo, Weber 5191.

Senecio longilobus Benth.

Sand and Gallinas Canyons, Weber 4422.

Senecio pseudaureus Rydb.

East of Sand Creek Canyon, Weber 4602.

Senecio riddellii T. & G.

North of Kenton, Cimarron Co., Oklahoma, Rogers 6415.

Solidago canadensis L.

Springfield, Allred 3312.

Solidago gigantea Ait.

Sandy flats of Cimarron River, Weber 5176.

Solidago glaberrima Martens.

Sand hills of Cimarron River, Weber 5156.

Solidago lindheimeriana Scheele.

Breaks of East Carrizo Creek, Weber 5098.

Sonchus asper (L.) Hill.

Breaks of East Carrizo Creek, Weber 5133.

Stephanomeria tenuifolia (Torr.) Hall.

Sand and Gallinas Canyons, Weber 4613.

Thelesperma megapotamicum (Spreng.) Kuntze.

Breaks of East Carrizo Creek, Weber 5111.

Verbesina encelioides (Cav.) Benth. & Hook.

Breaks of East Carrizo Creek, Weber 5110.

Vernonia marginata (Torr.) Raf.

Sand flats of Cimarron River, Weber 5193.

Xanthium italicum Moretti.

Breaks of East Carrizo Creek, Weber 5105.

Zinnia grandiflora Nutt.

Sand Creek Canyon, Harrington 3275.

CONVOLVULACEAE

Convolvulus incanus Vahl.

Sand and Gallinas Canyons, Weber 4330.

Evolvulus nuttallianus Roemer and Schultes.

Carrizo Creek, Harrington 3413.

Ipomoea leptophylla Torr.

Sand and Gallinas Canyons, Weber 4377.

CRUCIFERAE

Conringia orientalis (L.) Dum.

10 miles west of Springfield, Harrington & Smith 282.

Descurainia pinnata (Walt.) Britt.

Sand and Gallinas Canyons, Weber 4573.

Erysimum asperum (Nutt.) DC.

Sagebrush benches, north fork Cimarron River, Weber 4567.

Lepidium densiflorum Schrad. var. typicum Thell.

Pritchett. Scharff. sine numero.

Lesquerella ovalifolia Rydb.

Sand and Gallinas Canyons, Weber 4607.

Rorippa nasturtium-aquaticum (L.) Schinz & Thell.

Carrizo Canyon, Harrington 3373.

CUCURBITACEAE

Cucurbita foetidissima HBK.

South of Springfield, Harrington & Smith 327.

CYPERACEAE

Carex brevior (Dewey) Mack.

South of Springfield, Harrington 3428.

Carex gravida Bailey var. lunelliana (Mack.) Hermann.

Sand and Gallinas Canyons, Weber 4339.

Cyperus filiculmis Vahl.

Sand Canyon, Porter 4253.

Cyperus schweinitzii Torr.

Sand and Gallinas Canyons, Weber 4346.

Eleocharis macrostachya Britt.

Carrizo Canyon, Harrington 3398.

Scirpus americanus var. polyphyllus (Boeckl.) Beetle.

Near Cimarron River, Harrington & Smith 376.

Scirpus validus Vahl.

Sand Creek Canyon, Weber 5131.

EUPHORBIACEAE

Croton texensis (Klotzsch.) Muell, Arg.

Sand Creek Canyon, Harrington 3286.

* Ditaxis mercurialina (Nutt.) Coult.

Sand and Gallinas Canyons, Weber 4356.

Euphorbia dentata Michx.

Breaks of East Carrizo Creek, Weber 5097.

Euphorbia fendleri T. & G.

Breaks of Carrizo Creek, Weber 4369.

Euphorbia lata Engelm.

Spring Canyon, breaks of Cimarron River, Weber 4593.

Euphorbia marginata Pursh.

Sandy flats of Cimarron River, Weber 5147.

Euphorbia missurica Raf. var. intermedia (Engelm.) Wheeler.

South of Springfield, Harrington & Smith 351.

Euphorbia revoluta Engelm.

Breaks of East Carrizo Creek, Weber 5104.

Euphorbia robusta (Engelm.) Small.

Sand Creek Canyon, Harrington 4188.

Euphorbia stictospora Engelm.

Breaks of East Carrizo Creek, Weber 5100.

Stillingia salicifolia (Torr.) Raf.

Sand hills of Cimarron River, Weber 5153.

Tragia nepetaefolia Cav.

Sand Creek Canyon, Harrington 3272.

FAGACEAE

Quercus gambelii Nutt.

Las Animas Co.: just west of Baca Co. line, Weber 4394.

Quercus undulatus Torr.

Las Animas Co.: just west of Baca Co. line, Weber 4417.

* Q. grisea

FUMARIACEAE

Corydalis aurea Willd. var. occidentalis Engelm.

10 miles south of Pritchett, Harrington 2516.

GENTIANACEAE

** Swertia coloradense Rogers.

Six miles south of Utleyville, Rogers 6423.

GRAMINEAE

Agropyron smithii Rydb.

Sand hills of Cimarron River, Weber 5151.

Andropogon gerardi Vitman.

Las Animas Co.: Tecolote Mesa, Rogers 4686.

Andropogon hallii Hackel.

Sand hills of Cimarron River, Weber 5163.

Andropogon saccharoides Swartz.

Sand and Gallinas Canyons, Weber 4329.

Andropogon scoparius Michx.

Sand hills of Cimarron River, Weber 5161.

Aristida adscenscionis L.

Breaks of East Carrizo Creek, Weber 5085.

Aristida arizonica Vasey.

Las Animas Co.: just west of Baca Co. line, Weber 4415.

Aristida divaricata Humb. and Bonpl.

Sand and Gallinas Canyons, Weber 4331.

Aristida longiseta Steud. var. robusta Merr.

Sand Canyon, Porter 4254.

Aristida purpurea Nutt.

Sand and Gallinas Canyons, Weber 4375.

Bouteloua eriopoda (Torr.) Torr.

Carrizo Canyon, Harrington 4216.

Buchloe dactyloides (Nutt.) Engelm.

Sand and Gallinas Canyons, Weber 4613.

Calamovilfa gigantea (Nutt.) Scribn. and Merr.

Sandy flats of Cimarron River, Weber 5173.

Echinochloa crusgalli (L.) Beauv.

Breaks of East Carrizo Creek, Weber 5108.

Elymus canadensis L. var brachystachys (Scribn. & Ball) Farwell.

Sand Canyon, Porter 4273.

Eragrostis cilianensis (All.) Link.

Breaks of East Carrizo Creek, Weber 5132.

Eragrostis curtipedicellata Buckl.

Sand Canyon, Porter 4552.

Eragrostis secundiflora Presl.

Sand and Gallinas Canyons, Weber 4372.

Eragrostis spectabilis (Pursh.) Steud.

Sand and Gallinas Canyons, Weber 4337.

Festuca octoflora

Sand and Gallinas Canyons, Weber 4619.

Lycurus phleoides HBK.

Sand and Gallinas Canyons, Weber 4357.

Muhlenbergia arenicola Buckl.

Sand and Gallinas Canyons, Weber 4338.

Muhlenbergia racemosa (Michx.) BSP.

Breaks of East Carrizo Creek, Weber 5140.

Muhlenbergia torreyi (Kunth.) Hitchc.

Sand hills of Cimarron River, Weber 5178.

Munroa squarrosa (Nutt.) Torr.

Sand and Gallinas Canyons, Weber 4362.

Oryzopsis micrantha (Trin. and Rupr.) Thurber.

Carrizo Canyon, Harrington 3400.

Panicum capillare L.

Sand and Gallinas Canyons, Weber 4365.

Panicum obtusum HBK.

Sand and Gallinas Canyons, Weber 4368.

Paspalum stramineum Nash.

North of Kenton, Rogers 5077.

Poa fendleriana (Steud.) Vasey.

Sand and Gallinas Canyons, Weber 4613.

Redfieldia flexuosa (Thurber) Vasey.

Sandy flats of Cimarron River, Weber 5167.

Setaria lutescens (Weigel.) F. T. Hubb.

Sand and Gallinas Canyons, Weber 4376.

Setaria macrostachya HBK.

Sand and Gallinas Canyons, Weber 4335.

Sitanion hystrix (Nutt.) J. G. Smith.

Sand and Gallinas Canyons, Weber 4615.

Sorghum halepense (L.) Pers.

Between Kirkwell and Campo, Weber 5208.

Sporobolus cryptandrus (Torr.) Gray.

Sandy flats of Cimarron River, Weber 5159.

Sporobolus giganteus Nash.

Sandy flats of Cimarron River, Weber 5194.

Sporobolus neglectus Nash.

North of Campo, Weber 5206.

Stipa scribneri Vasey.

Las Animas Co.: Carrizo Mountain, Rogers 6121.

Trichachne californica (Benth.) Chase.

Sand Canyon, Porter 4255.

Triodia elongata (Buckl.) Scribn.

Sand and Gallinas Canyons, Weber 4320.

Triodia pilosa (Buckl.) Merr.

Breaks of Cimarron River, Weber 4587.

Triplasis purpurea (Walt.) Chapm.

Sandy flats of Cimarron River, Weber 5145.

GROSSULARIACEAE

Ribes cereum Dougl.

Sand Creek Canyon, Weber 3295.

JUNCACEAE

Juncus balticus Willd. var. montanus Engelm.

Cimmaron River, Harrington & Smith 375.

Juncus interior Wiegand.

Sand Creek Canyon, Harrington 4177.

Juncus nodosus L.

Carrizo Canyon, Harrington 3397.

Juncus torreyi Coville.

Sand Creek Canyon, Harrington 4195.

LABIATAE

Hedeoma drummondii Benth.

Sand Creek Canyon, Weber 3300.

Monarda pectinata Nutt.

Sand and Gallinas Canyons, Weber 4612.

Salvia reflexa Hornem.

Breaks of East Carrizo Creek, Weber 5092.

Teucrium laciniatum Torr.

Carrizo Creek, Harrington 3387.

LEGUMINOSAE

Amorpha canescens Pursh.

Sand and Gallinas Canyons, Weber 4355.

Astragalus ceramicus Sheld.

Sand flats of Cimarron River, Weber 4578.

Astragalus lotiflorus Hook.

Sand flats of Cimarron River, Weber 4579.

Astragalus missuriensis Nutt.

Two Buttes Creek, Weber 4557.

Astragalus mollissimus Torr.

Mouth of Sand Creek Canyon, Weber 3293.

Astragalus parviflorus (Pursh) Nutt.

Carrizo Canyon region, Porter 4292.

Dalea aurea Nutt.

Breaks of East Carrizo Creek, Weber 5134.

Dalea enneandra Nutt.

Sand and Gallinas Canyons, Weber 4321.

Dalea formosa Torr.

Sand and Gallinas Canyons, Weber 4616.

Dalea jamesii T. and G.

Sand and Gallinas Canyons, Weber 4347.

Dalea lanata Spreng.

Sand hills of Cimarron River, Weber 5141.

Dalea nana Torr.

Sandy flats of Cimarron River, Weber 5144.

* Desmanthus cooleyi (Eaton) Trel.

Sand Canyon, Porter 4261.

Desmanthus illinoensis (Michx.) MacM.

Cimarron River channel and bars, Weber 4581.

* Hoffmanseggia drepanocarpa Gray.

Breaks of East Carrizo Creek, Weber 5113.

Hoffmanseggia jamesii T. and G.

Sandy flats of Cimarron River, Weber 5195.

* Krameria ~~secundiflora DC.~~ lanceolata Torr.

Sand Canyon, Porter 4278.

Lathyrus stipulaceus (Pursh) Butters and St. John.

Sand and Gallinas Canyons, Weber 4617.

Lathyrus incanus (Smith & Rydb.) Rydb.

9 miles south of Pritchett, Weber 3284.

Melilotus alba Desv.

Between Kirkwell and Campo, Weber 5187.

* Mimosa borealis Gray.

Sand and Gallinas Canyons, Weber 4361.

Petalostemon candidus (Willd.) Michx.

Sand flats of Cimarron River, Weber 5088.

Petalostemon compactus (Spreng.) Swezey.

Sandy flats of Cimarron River, Weber 5169.

Petalostemon villosus Nutt.

Sand hills of Cimarron River, Weber 5143.

Psoralea argophylla Pursh.

Carrizo Canyon region, Porter 4293.

Psoralea lanceolata Nutt.

To be expected in sandy grasslands.

Psoralea tenuiflora Pursh.

To be expected in Carrizo region.

* Schrankia ~~microphylla (Dryad) Standl.~~ = occidentalis (Wats. & A.) A.

Cimarron River, Harrington.

* Schrankia nuttallii (DC.) Standl. = S. uncinata

Cimarron River, Harrington.

Sophora sericea Nutt.

Sand Arroyo south of Walsh, Weber 4386.

Strophostyles pauciflora (Benth.) Wats.

Sandy flats of Cimarron River, Weber 5168.

LILIACEAE

Allium textile Nels. and Macbr.

Prowers Co.: Low sandstone rimrock ridge, Weber 4549.

reported from "E of Trinidad"

Nolina greenei S. Wats.

Collected by Goodman in Tesesquite Canyon near Kenton, Oklahoma.

LINACEAE

Linum aristatum Engelm. var. australe (Heller) Kearney and Peebles.

Springfield, J. H. Christ 352.

Linum lewisii Pursh.

Eight miles north of Pritchett, J. H. Christ 356.

Linum rigidum (Pursh) Small.

15 miles west of Springfield, Harrington & Smith 286.

LOASACEAE

Mentzelia decapetala (Pursh) Urban and Gilg.

Breaks of East Carrizo Creek, Weber 5084.

* Mentzelia oligosperma Nutt.

Breaks of East Carrizo Creek, Weber 5087.

Mentzelia stricta (Osterh.) Stevens.

Sand and Gallinas Canyons, Weber 4380.

LORANTHACEAE

Arceuthobium cryptopodum Engelm.

Las Animas Co.: Mesa de Maya, Rogers 6089.

MALVACEAE

* Abutilon incanum (Link.) Sweet.

Sand and Gallinas Canyons, Weber 4354.

Sphaeralcea angustifolia (Cav.) D. Don.

Sand and Gallinas Canyons, Weber 4316.

Sphaeralcea coccinea (Nutt.) Rydb.

Sand Arroyo south of Walsh, Weber 4566.

MARTYNIACEAE

Martynia louisiana Mill.

Sand and Gallinas Canyons, Weber 4326.

NAIADACEAE

Zannichellia palustris L.

Breaks of East Carrizo Creek, Weber 5135.

NYCTAGINACEAE

Abronia fragrans Nutt.

Sand hills of Cimarron River, Weber 5157.

Mirabilis lanceolata (Rydb.) Standl.

South of Pritchett, Harrington 3336.

Mirabilis linearis Pursh.

Breaks of East Carrizo Creek, Weber 5117.

ONAGRACEAE

Gaura coccinea Nutt.

Breaks of Cimarron River, Weber 4595.

Gaura parviflora Dougl.

Sand hills of Cimarron River, Weber 5178.

Gaura villosa Torr.

Sand hills of Cimarron River, Weber 5142.

Oenothera albicaulis Pursh.

Prowers Co.: Low sandstone rimrock ridge, Weber 4550.

Oenothera engelmannii (Small) Munz.

Sandy flats of Cimarron River, Weber 5173.

* Oenothera greggii Gray.

Sand and Gallinas Canyons, Weber 4608.

Oenothera hookeri T. & G.

Breaks of East Carrizo Creek, Weber 5123.

Oenothera lavandulaefolia T. & G.

Two Butte Creek, Weber 4554.

Oenothera serrulata Nutt.

Spring Canyon, Weber 4592.

OROBANCHACEAE

Orobanche multiflora Nutt.

Carrizo Canyon, Harrington 3410.

PLANTAGINACEAE

Plantago purshii Roem. and Schult.

Sand and Gallinas Canyons, Weber 4624.

POLEMONIACEAE

Gilia acerosa (Gray) Britt.

Spring Canyon, Weber 4589.

Gilia laxiflora (Coult.) Osterh.

Sand Creek Canyon, Harrington 2536.

Gilia longiflora (Torr.) Don.

Sand hills of Cimarron River, Weber 5160.

POLYGALACEAE

Polygala alba Nutt.

Two Buttes Petrified Forest, Christ 370.

POLYGONACEAE

Eriogonum effusum Nutt.

10 miles west of Springfield, Harrington & Smith 281.

Eriogonum jamesii Benth.

25 miles south of Pritchett, Harrington 4172.

Eriogonum lachnogynum Torr.

Breaks of Cimarron River, Weber 4598.

Eriogonum tenellum Torr.

Sand Creek Canyon, Harrington 4185.

Polygonum convolvulus L.

Carrizo Canyon, Harrington 4207.

Polygonum lapathifolium L.

Between Kirkwell and Campo, Weber 5125.

Polygonum pennsylvanicum (L.) Small.

Between Kirkwell and Campo, Weber 5188.

Polygonum ramosissimum Michx.

Breaks of East Carrizo Creek, Weber 5107.

Rumex venosus Pursh.

South of Springfield, Harrington & Smith 344.

RANUNCULACEAE

Myosurus minimus L.

15 miles south of Burlington, Harrington & Smith 378.

Ranunculus cymbalaria Pursh. var. saximontanus Fernald.

Sand and Gallinas Canyons, Weber 4618.

ROSACEAE

Cercocarpus montanus Raf.

North of Kenton, Oklahoma, Weber 4643.

Prunus virginiana L.

Sand and Gallinas Canyons, Weber 4605.

SALICACEAE

Populus sargentii Dode.

Sand and Gallinas Canyons, Weber 4572.

Populus wislizeni (S. Wats.) Sarg.

Sand and Gallinas Canyons, Harrington 2506.

Salix amygdaloides Anders.

Sand flats of Cimarron River, Weber 5164.

Salix interior Rowlee.

Bars and channel of Cimarron River, Weber 4580.

SAPINDACEAE

Sapindus saponaria L. var. drummondii (H. & A.) Benson.

Sand and Gallinas Canyons, Weber 4317.

SCROPHULARIACEAE

Castilleia sessiliflora Pursh.

Sand and Gallinas Canyons, Weber 4604.

Pentstemon albidus Nutt.

Spring Canyon, Breaks of Cimarron River, Weber 4594.

Pentstemon ambiguus Torr.

Grassland of mesatop above East Carrizo Creek, Weber 5184.

Pentstemon cobaea Nutt.

1 mile east of Pritchett, Rogers 5929.

Penstemon nitidus Dougl.

Sagebrush flats along Cimarron River, Weber 4575.

Verbascum thapsus L.

West of Springfield, Harrington & Smith 279.

Veronica anagallis-aquatica L.

Carrizo Canyon, Harrington 3393.

SOLANACEAE

Chamaesaracha conioides (Moric.) Britt.

Breaks of East Carrizo Creek, Weber 5112.

Physalis lanceolata Michx.

South of Springfield, Harrington & Smith 336.

Physalis lobata Torr.

Sand and Gallinas Canyons, Harrington 2501.

Physalis longifolia Nutt.

Breaks of East Carrizo Creek, Weber 5091.

Solanum americanum Mill.

Breaks of East Carrizo Creek, Weber 5086.

Solanum rostratum Dunal.

Sand hills of Cimarron River, Weber 5177.

Solanum triflorum Nutt.

Breaks of East Carrizo Creek, Weber 5120.

TAMARICACEAE

Tamarix gallica L.

Sand Arroyo south of Walsh, Weber 4564.

ULMACEAE

Celtis occidentalis L. var. crassifolia (Lam.) Gray.

Sand Creek Canyon, Harrington 3281.

UMBELLIFERAE

Cymopterus acaulis (Pursh.) Raf.

Prowers Co.: Low sandstone rimrock ridge, Weber 4551.

Cymopterus montanus (Nutt.) T. & G.

Two Buttes Creek, Weber 4556.

URTICACEAE

Parietaria pennsylvanica Muhl.

Carrizo Canyon, Harrington 3372.

VERBENACEAE

Verbena ambrosifolia Rydb.

Breaks of Cimarron River, Weber 4588.

Verbena bipinnatifida Nutt.

East of Springfield, Harrington 4198.

Verbena bracteosa Michx.

Between Kirkwell and Campo, Weber 5189.

Verbena stricta Vent.

Between Kirkwell and Campo, Weber 5204.

VITACEAE

Parthenocissus vitacea Hitchc.

Breaks of East Carrizo Creek, Weber 5139.

* Vitis longii Prince.

Sand and Gallinas Canyons, Weber 4340.

ZYGOPHYLLACEAE

Kallstroemia hirsutissima Vail.

Breaks of East Carrizo Creek, Weber 5102.

Tribulus terrestris L.

Mesa top above East Carrizo Creek, Weber 5180.

In order to avoid useless repetition, the complete citations of the following localities are omitted from the annotated list. The left-hand column of the table below contains the localities as herein cited; the right-hand column contains the extended description as it appears on the herbarium labels. Unless otherwise designated, all collections cited above were made in Baca County. A few collections from adjacent areas are included because of their close proximity to the region studied.

Carrizo Canyon region	Basalt-capped mesas, sandstone cliffs, talus slopes, canyon floors along Carrizo Creek
Bars and channel of Cimarron	Shifting bars, channel, Cimarron River on Pfeiffer Ranch, southeastern corner of Baca County
Sand hills and flats	Sand hills and flats on south bank of Cimarron River of Pfeiffer Ranch, southeastern corner of Baca County
Cimarron "breaks"	"Breaks" of the Cimarron, 2 mi. s. of Midway
North Fork Cimarron	Limestone rimrock, North Fork of Cimarron south of Stonington
Grassland of mesatop	Grassland of mesatop above east Carrizo Creek, 4 mi. s.w. of Kirkwell.
Sand Arroyo	Badly depleted pastureland in Sand Arroyo south of Walsh
Sand Creek	Mesatops, slopes, canyon floors, Sand Creek Canyon, 27 mi. s. of Pritchett
Sand and Gallinas Canyons	Mesatops, talus slopes, canyon floors, confluence of Sand and Gallinas canyons, 27 mi. s. of Pritchett

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